



EV2662-C-00A

Evaluation Board of 500mA Linear Charger with Power Path Management, 1mA Termination and <1µA Battery Leakage for Single-Cell Li-Ion Battery

DESCRIPTION

The EV2662-C-00A is an evaluation board for the MP2662, a highly-integrated single-cell Li-Ion/Li-Polymer battery charger with system power path management, targeted at space limited portable applications. It takes input power from either an AC adapter or a USB port to supply the system load and charge the battery independently. The charger section features constant current pre charge (PRE.C), constant current fast charge (CC) and constant voltage (CV) regulation, charge termination and charge status.

EV2662 ensures the continuous power to the system by automatically selecting the input, the battery or both to power the system.

EV2662 provides system short circuit protection to prevent the Li-Ion battery from being damaged due to excessive high current.

EV2662 cuts off the path between battery and system when battery UVLO to prevent the Li-Ion battery from being overly discharged.

Through the I2C connector on EV2662, the customer can program the charging parameters, such as: input current limit, input minimum voltage regulation, charging current, battery regulation voltage, and battery UVLO.

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	4.35 - 5.5	V
Battery Voltage	V_{BATT}	3.60 - 4.545	V
Input Current Limit	I_{IN_LIM}	50 - 500	mA
Input Minimum Voltage Regulation	V_{IN_MIN}	3.88 - 5.08	V
Fast Charge Current	I_{CC}	8 - 456	mA
Discharge Current	I_{DSCHG}	400 - 3200	mA

FEATURES

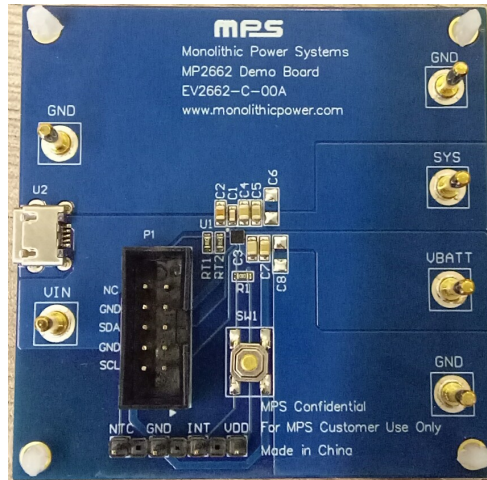
- Fully Autonomous Charger for Single-Cell Li-Ion/Polymer Batteries
- Current Limit for USB Port
- Complete Power Path Management for Simultaneously Powering the System and Charging the Battery
- 0.5% Charging Voltage Accuracy
- 21V Maximum Voltage for the Input Source
- I²C Interface for Setting charging Parameters and Status Reporting
- Robust Charging Protection Including Battery Temperature Monitor and Programmable Timer
- Battery Disconnection Function

APPLICATIONS

- Wearable devices
- Smart Handheld Devices
- Fitness Accessories
- Smart Watches

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EV2662-C-00A EVALUATION BOARD

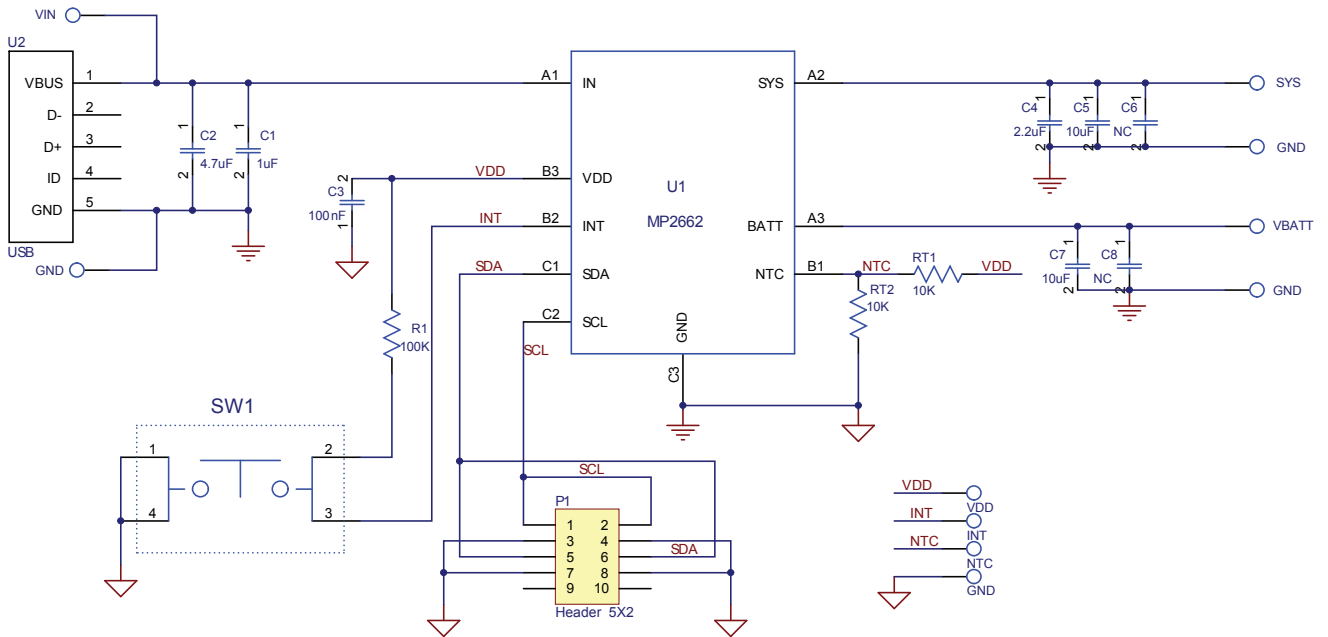


(L x W x H) 2.5" x 2.5" x 0.063"
(6.35cm x 6.35cm x 0.16cm)

Board Number	MPS IC Number
EV2662-C-00A	MP2662GC-xxxx*

*: "xxxx" is the register setting option. The factory default is "0000". This content can be viewed in I²C register map. For customer options, please contact an MPS FAE to obtain an "xxxx" value.

EVALUATION BOARD SCHEMATIC



EV2662-C-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacture	Manufacture_PN
1	C1	1 μ F	Ceramic Capacitor;50V;X5R;0603;	0603	muRata	GRM188R61H105KAAL
1	C2	4.7 μ F	Ceramic Capacitor;50V;X5R;0805;	0805	muRata	GRM21BR61H475KE51
1	C4	2.2 μ F	Ceramic Capacitor;25V;X7R;0805;	0805	muRata	GRM21BR71E225KA73L
1	C3	100nF	Ceramic Capacitor;25V;X7R;0805	0805	muRata	GRM21BR71E104KA01L
2	C5,C7	10 μ F	Ceramic Capacitor;16V;X7R;0805	0805	muRata	GRM21BR61C106KE15
1	C6	NC	Ceramic Capacitor;25V;X7R;1206	1206	muRata	GRM31CR71E475KA88L
1	C8	NC	Ceramic Capacitor;25V;X7R;1206	1206	muRata	GRM21BR71E475KA73L
1	P1		Header, 5-Pin, Dual row			
1	R1	100K	Film Resistor;1%;	0603	Yageo	RC0603FR-07100KL
2	RT1, RT2	10K	Film Resistor;1%;	0603	Yageo	RC0603FR-0710KL
1	U2		Micro-B USB connector;			
1	U1		IC;1.75mm*1.75mm	WLCSP-9	MPS	MP2662GC-0000

PRINTED CIRCUIT BOARD LAYOUT

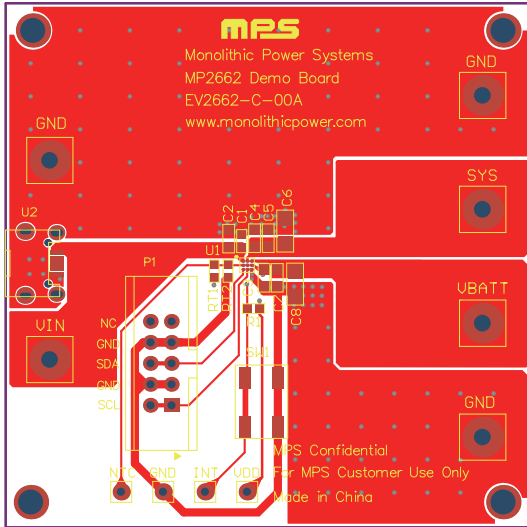


Figure 1: Top Layer

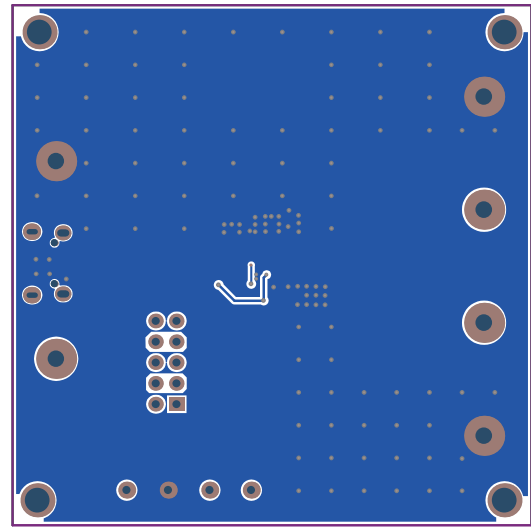


Figure 2: Bottom Layer

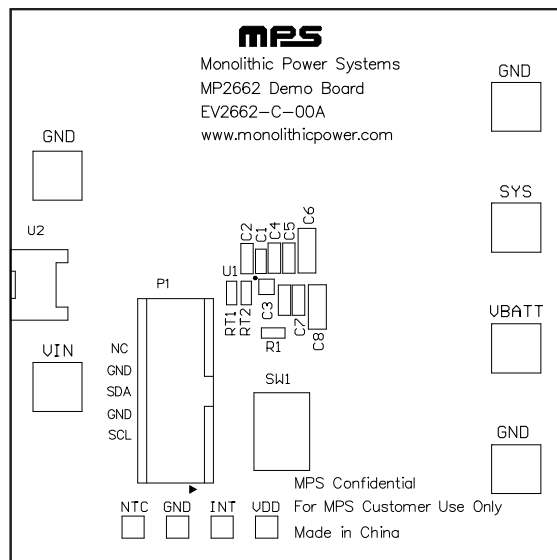


Figure 3: Top Silk Layer

QUICK START GUIDE

This board is designed for MP2662 which is a highly-integrated single-cell Li-Ion/Li-Polymer battery charger with system power path management function. And layout accommodates most commonly used capacitors. The default function of this board is preset for charger mode and the charge full voltage is preset to 4.200V for 1 cell Li-Ion battery.

Evaluation Platform Preparation:

- 1) A computer with at least one USB port and a USB cable. The MP2662 evaluation software must be properly installed.
- 2) USB-to-I²C Communication Kit (EVKT-USBI2C-02)



Figure 4: USB-to-I²C Communication Kit

- 3) Software - Double-click on the “MP2662 Evaluation Kit” EXE file to run the MP2662 evaluation software. The software supports the Windows® XP and Windows 7 operating systems.

The MP2662 Evaluation Kit EXE file is available on MPS website:

<http://hz-coc-ebench/InstallationFile.aspx?categoryID=7>

GUI

Show entries

Name	Description	Download
MP2638 Evaluation Kit	I2C evaluation kit software for MP2638, V1.1.7.	
MP2638A Evaluation Kit	Evaluation kit for MP2638A, V1.0. Parts supported: MP2638A.	
MP2650	for Charge group	
MP2660 Evaluation Kit	I2C evaluation kit software for MP2660, V1.6.7. Parts supported: MP2660.	
MP2661 Evaluation Kit	I2C evaluation kit software for MP2661, V1.1.5. Parts supported: MP2661.	
MP2662 Evaluation Kit NEW	I2C evaluation kit software for MP2662, V1.0.	
MP2663 Evaluation Kit	I2C evaluation kit software for MP2663, V1.0. Parts supported: MP2663.	
MP2664 Evaluation Kit	I2C evaluation kit software for MP2664, V1.1.	
MP2669 Evaluation Kit	I2C evaluation kit software for MP2669, V1.0.	
MP2673 Evaluation Kit	I2C evaluation kit software for MP2673, V1.0.	

Previous 1 2 3 4 Next

Figure 5: MP2662 Evaluation Kit EXE file on Ebench

4) Original Test Setup for MP2662 in Figure6

Attach the input voltage ($V_{IN}=5V$) and the input ground to the VIN and GND pins, respectively.

Attach the positive and negative ends of the load to the SYS and GND pins, respectively.

Attach the positive and negative ends of the battery ($V_{BATT}=3 - 4.2V$) to the BATT and GND pins, respectively.

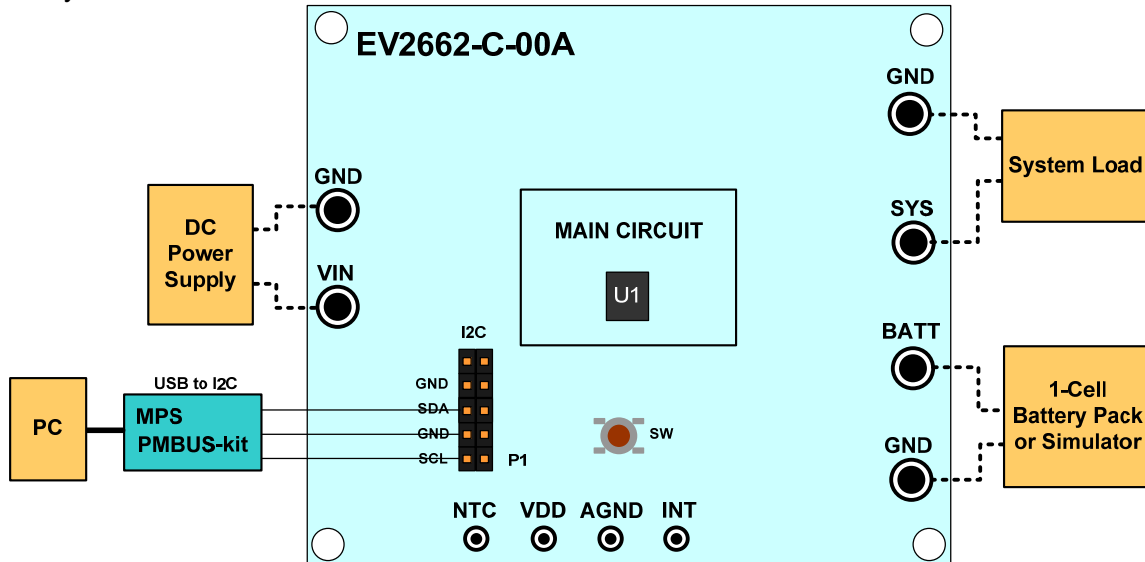


Figure 6: Test Setup for MP2662

5) Turn on the computer. Launch the MP2662 evaluation software. The main window of the software is shown in Figure 7.

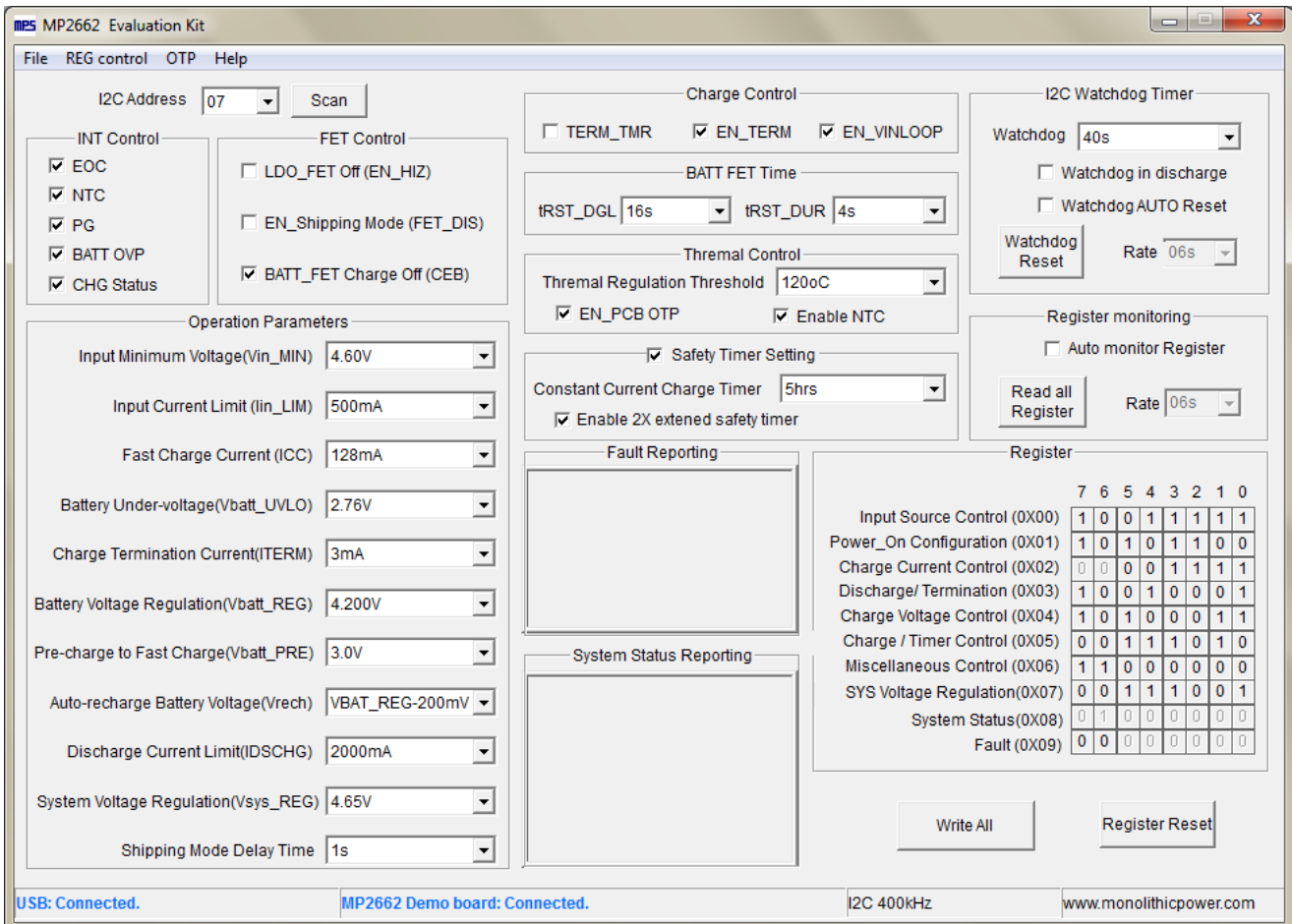


Figure 7: MP2662 evaluation interface

Procedure

Make sure all the connections are normal – both the USB-to-I2C Communication Kit and the EV2662-C-00A are connected correctly. It is ready to run the program!

Charger Function

Operation Parameters	
Input Minimum Voltage(Vin_MIN)	4.60V
Input Current Limit (Iin_LIM)	500mA
Fast Charge Current (ICC)	128mA
Battery Under-voltage(Vbatt_UVLO)	2.76V
Charge Termination Current(ITERM)	3mA
Battery Voltage Regulation(Vbatt_REG)	4.200V
Pre-charge to Fast Charge(Vbatt_PRE)	3.0V
Auto-recharge Battery Voltage(Vrech)	VBAT_REG-200mV
Discharge Current Limit(IDSCHG)	2000mA
System Voltage Regulation(Vsys_REG)	4.65V
Shipping Mode Delay Time	1s

1. Set Input Minimum Voltage at 4.60 V (the range is 3.88 - 5.08V)

Input Minimum Voltage (Vin_min)	4.60V
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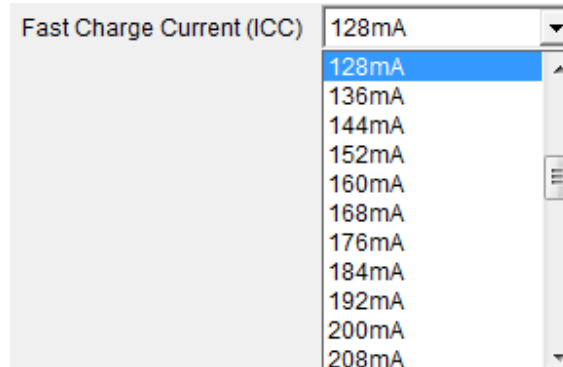
- 4.60V
- 4.68V
- 4.76V
- 4.84V
- 4.92V
- 5.00V
- 5.08V

2. Set Input Current Limit to 500mA (the range is 50 – 500mA)

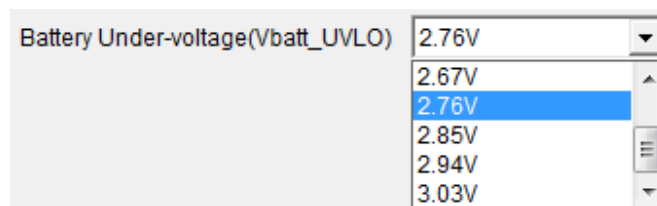
Input Current Limit (Iin_LIM)	500mA
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- 320mA
- 350mA
- 380mA
- 410mA
- 440mA
- 470mA
- 500mA

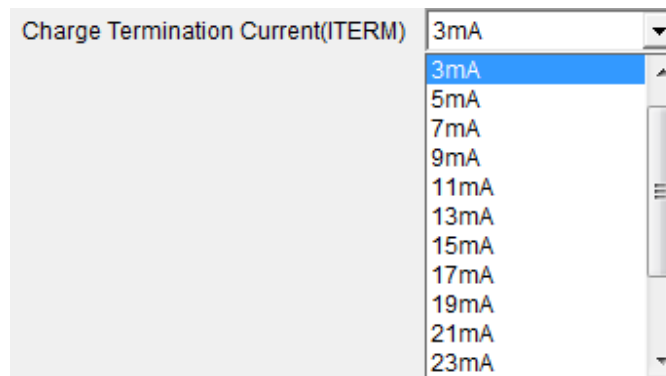
3. Set Fast Charge Current to 128mA (the range is 8 – 456mA)



4. Set BATT UVLO threshold to 2.76V (the range is 2.4 – 3.03V)



5. Set Charge Termination Current to 3mA (the range is 1 – 31mA)



6. Set Battery Regulation Voltage to 4.200V (the range is 3.6 - 4.545V)

Battery Regulation Voltage(Vbatt_REG)	4.200V
	4.200V
	4.215V
	4.230V
	4.245V
	4.260V
	4.275V
	4.290V
	4.305V
	4.320V
	4.335V
	4.350V

7. Set Pre - Charge to Fast Charge Threshold Voltage to 3.0 V (the range is 2.8 – 3.0V)

Pre-charge to Fast Charge(Vbatt_PRE)	3.0V
	2.8V
	3.0V

8. Set Battery Auto-recharge Voltage to VBAT_REG – 200mV (the range is 100mV or 200mV)

Auto-recharge Battery Voltage(Vrech)	VBAT_REG-200mV
	VBAT_REG-100mV
	VBAT_REG-200mV

9. Set Battery Discharge Current Limit to 2000mA (the range is 400mA to 3200mA):

Discharge Current Limit(IDSCHG)	2000mA
	2000mA
	2200mA
	2400mA
	2600mA
	2800mA

Others

1. INT Control Setting

INT Control

EOC

NTC

PG

BATT OVP

CHG Status

2. FET Control:

FET Control

LDO_FET Off (EN_HIZ)

EN_Shipping Mode (FET_DIS)

BATT_FET Charge Off (CEB)

EN_HIZ only controls the on/off of the LDO FET.

CEB only control the on/off of the Battery FET in charge mode.

FET_DIS selected could turn off the Battery FET at both charge and discharge mode.

FET_DIS unselected could not turn on Battery FET; pull INT to low by push button or plug in the input adapter for 2s could turn on Battery FET when it's turned off by FET_DIS

3. Termination Function Select

TERM_TMR EN_TERM

Table 1 Termination Function Selection Table

EN_TERM	TERM_TMR	After I _{BATT} hit I _{TERM} in CV mode	
		Operation	Charge Status
<input type="checkbox"/>	x	Keep CV Charge	Charge
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Charge Done	Charge Done
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Keep CV Charge	Charge

4. VINLOOP Control:

EN_VINLOOP

5. BATT FET Time Setting.

BATT FET Time

tRST_DGL tRST_DUR

6. Thermal Control.

Thermal Control

Thermal Regulation Threshold

EN_PCB OTP Enable NTC

Above setting enables PCB OTP; for other application, please refer to the table below.

Table 2 NTC Function Selection Table

Enable NTC	EN_PCB OTP	Function
<input type="checkbox"/>	x	Disable
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NTC
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	PCB OTP

7. Safety Timer Setting

Safety Timer Setting

Constant Current Charge Timer

Enable 2X extended safety timer

8. I²C Watchdog Timer

I2C Watchdog Timer

Watchdog

Watchdog in discharge

Watchdog AUTO Reset

Rate

9. Resister Auto Monitor

Register monitoring

Auto monitor Register

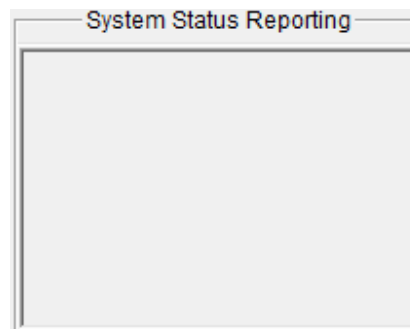
Read all Register

Rate

10. Content of the Registers:

Register	7	6	5	4	3	2	1	0
Input Source Control (0X00)	1	0	0	1	1	1	1	1
Power_On Configuration (0X01)	1	0	1	0	1	1	0	0
Charge Current Control (0X02)	0	0	0	0	1	1	1	1
Discharge/ Termination (0X03)	1	0	0	1	0	0	0	1
Charge Voltage Control (0X04)	1	0	1	0	0	0	1	1
Charge / Timer Control (0X05)	0	0	1	1	1	0	1	0
Miscellaneous Control (0X06)	1	1	0	0	0	0	0	0
SYS Voltage Regulation(0X07)	0	0	1	1	1	0	0	1
System Status(0X08)	0	1	0	0	0	0	0	0
Fault (0X09)	0	0	0	0	0	0	0	0

11. Monitor the MP2662 operation status and Fault report



❖Notes❖

Please contact local FAE to apply:

1. The latest datasheet to get the other detailed description on the operation of this part
2. The “MP2662 Evaluation Kit” EXE file

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